

#738

78-051A-06D

PIONEER-VENUS

DIGITAL IMAGING DATA

78-051A-06D

PIONEER VENUS

CLOUD PHOTOPOLARIMETER (OCCP)

DIGITAL IMAGING DATA

THIS DATASET CONSISTS OF 15 TAPES. THE "D" TAPES ARE 9-TRACK 6250 BPI DENSITY, BINARY WHILE THE "C" TAPES ARE 3480 CARTRIDGES. THE FIRST 8 CARD IMAGE FILES OF EACH TAPE USES EBCDIC CHARACTER CODE. A USER SHOULD FIRST LIST THE INITIAL CARD IMAGE FILE WHICH PROVIDES THE COMPLETE INFORMATION ON THE TAPE FORMAT AND REMAINING FILES. A COMPLETE LISTING OF THE TWO PROGRAM SOURCE CODES (FILES #2 AND #4), AS WELL AS THE RESPECTIVE EXPLANATION TEXT FILES (#3 AND #5) HAVE BEEN INCLUDED IN THIS CATALOG. THE "D" AND "C" NUMBER ALONG WITH THEIR TIME SPANS ARE AS FOLLOWING:

D#	C#	FILES	TIMESPAN
D-103920	C-031208	108	02/21/80-04/14/80
D-103921	C-031209	104	04/14/80-05/10/80
D-103922	C-031210	101	05/10/80-06/03/80
D-103923	C-031211	101	06/04/80-12/29/80
D-103924	C-031212	110	01/27/82-03/06/82
D-103925	C-031213	111	03/06/82-04/03/82
D-103926	C-031214	112	04/03/82-04/29/82
D-103927	C-031215	108	04/30/82-05/04/83
D-103928	C-031216	112	05/04/83-06/12/83
D-103929	C-031217	112	06/13/83-03/14/85
D-103930	C-031218	112	03/14/85-04/25/85
D-103931	C-031219	112	04/26/85-06/01/85
D-103932	C-031220	112	06/01/85-08/06/86
D-103933	C-031221	112	08/06/86-06/13/88
D-103934	C-031222	40	06/13/88-03/20/90



National Aeronautics and
Space Administration

Goddard Space Flight Center

Goddard Institute for Space Studies

2880 Broadway
New York, N.Y. 10025
(212) 678-5500

October 15, 1993

NSSDC/Code 633.9
Attn: Ed Bell
Goddard Space Flight Center
Greenbelt, MD 20771

Dear Mr. Bell:

Enclosed are five tapes designated OCPP05 through OCPP08 and OCPP19 which are to be added to the digital imaging data archive for the Pioneer Venus Orbiter Cloud Photopolarimeter (OCPP). Along with tapes OCPP09 through OCPP18 submitted in March of this year, they constitute all of the OCPP imaging data for the period from 02/21/80 through the end of the Pioneer Venus mission. (For your reference, I enclose a copy of my letter explaining the details of that submission in March.) Also enclosed is a printed listing of the catalog of the OCPP imaging data files on all of the tapes as well as a 3.5" diskette with the catalog in the form of a single MS-DOS format file.

Sincerely,

Larry D. Travis

Enclosures

cc: L. Lasher



National Aeronautics and
Space Administration

Goddard Space Flight Center

Goddard Institute for Space Studies
2880 Broadway
New York, N.Y. 10025
(212) 678-5500

March 4, 1993

NSSDC/Code 633.9
Attn: Ed Bell
Goddard Space Flight Center
Greenbelt, MD 20771

Dear Mr. Bell:

Enclosed are ten tapes which constitute somewhat more than half of the new digital version of the archive of Pioneer Venus Orbiter Cloud Photopolarimeter (OCPV) imaging data. The OCPV acquired two basic types of observations: images at a single, near-ultraviolet wavelength with a spatial resolution of approximately 30 km; and lower spatial resolution polarimetry maps at four wavelengths. Polarimetry map data has been archived on magnetic tapes (72 so far) that appear in the NSSDC catalog as entry 78-051A-06B, although the current catalog name for that data set is the potentially confusing "DIGITAL MAP IMAGES ON MAG TAPE". A better choice for that data set name would be "POLARIMETRY MAP DATA". I note that the time span for that data set is incorrectly listed as 7812-8605 rather than the actual 7812-8804. The NSSDC catalog entry 78-051A-06D seems to represent a projection that I made in response to a NSSDC survey several years ago for additional submissions intended for the archive data set designated by 78-051A-06B.

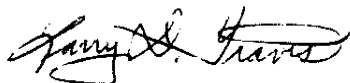
The original form of submission for the OCPV imaging data was 4" x 5" monochrome negatives and is represented by the 420 negatives listed under NSSDC catalog entry 78-051A-06C. Subsequently, it was decided to convert to a digital archive of the OCPV imaging data. Although a prototype tape of this digital format of the imaging data was sent to Paul Butterworth for review about two years ago, the present delivery represents the first formal submission of this new OCPV archival product. Of course, it should be assigned a distinct NSSDC catalog entry. I believe that an appropriate name for this data set would be "DIGITAL IMAGING DATA".

Also enclosed is a catalog listing of the OCPV images on these tapes (designated using tape numbers OCPV09 through OCPV18) by respective tape and file numbers as well as a single page of archive description and instructions for the potential user. As is explained on that sheet, the intent was for each tape to be a self-contained segment of the archive, independent of the other tapes and providing the user not only with the data, but also on the tape in the first eight "card image" text files, a complete description of the data and the means to use it without recourse to any other source of data or documentation. The remainder of this archive data set will be on nine more tapes (OCPV01 - OCPV08 and OCPV19) that should be submitted in several months. I should also note that I expect that several more tapes of polarimetry data

will be submitted over that same time frame to complete the OCPP polarimetry data archive under NSSDC catalog entry 78-051A-06B.

Thanks in advance for your help in getting this OCPP imaging data archive set up.

Sincerely,

A handwritten signature in cursive script, appearing to read "Larry D. Travis".

Larry D. Travis

Enclosures

cc: L. Lasher

PIONEER VENUS ORBITER CLOUD PHOTOPOLARIMETER

IMAGING ARCHIVE TAPE

DESCRIPTION AND INSTRUCTIONS

Using a spin-scan imaging approach, the Pioneer Venus Orbiter Cloud Photopolarimeter (OCP) acquired images of the clouds of Venus in the near ultraviolet with a spatial resolution of approximately 30 km. The images were generated by sampling the incident radiance as the OCP telescope line of sight was swept across the disk of the planet by spacecraft rotation to create scan lines, while the motion of the spacecraft in its nearly polar orbit provided the cross-scan translation to build up a full-disk image over a period of about four hours.

Digital imaging data from the OCP for the Pioneer Venus Mission have been archived on magnetic tapes with approximately 100 images per tape, organized with a separate tape file for each image. Preceding these image data files on each tape are eight card image files written with EBCDIC character code and using fixed block record format (RECFM=FB), logical record length of 80 bytes (LRECL=80), and block size of 4000 bytes (BLKSIZE=4000). The first of these eight files explains the tape format and organization and gives a detailed description of the contents of the remaining seven card image files. Those files contain the complete source codes (in standard Fortran 77) for two programs which read the imaging data files and perform the basic data reduction including the "navigation" of the image pixels, namely, the specification of the planetary latitude and longitude corresponding to the center of the pixel as well as the scattering geometry. The other card image files include two ancillary files containing Pioneer Venus Orbiter spacecraft orbital elements and attitude information, two additional text files intended to be read and printed out by the two programs to provide further explanation on program function and use, and an image catalog for the specific data archived on each tape.

The intent of the archive format is to have each tape represent a self-contained segment of the archive, independent of the other tapes and providing the user with a complete description of the data and the means to use it without recourse to any other source of data or documentation. The original archive tapes are 2400-ft open reels, 9-track, and 6250-bpi density, and use EBCDIC character code for the eight card image files at the beginning of the tape. A user should first list the initial card image file, which provides the complete information on the tape format and remaining files. Listings of the two program source codes (files #2 and #4) and the respective explanation text files (#3 and #5) may also assist the user in preparing to process the imaging data.

DSC #138

78-051A-06D

Printed from disk

PIONEER VENUS ORBITER CLOUD PHOTOPOLARIMETER (OCPP)

IMAGING DATA CATALOG

IMAGE NO.	TAPE NO.	FILE NO.	YR	DOY	IMAGE START TIME	YR	DOY	IMAGE END TIME
0807	OCPP09	9	82	27	11:32	82	27	15:00
0810	OCPP09	10	82	35	09:53	82	35	13:50
0811	OCPP09	11	82	35	19:20	82	35	21:33
0812	OCPP09	12	82	36	14:45	82	36	17:54
0813	OCPP09	13	82	36	18:21	82	36	21:36
0814	OCPP09	14	82	37	04:43	82	37	07:39
0815	OCPP09	15	82	37	07:53	82	37	11:38
0816	OCPP09	16	82	37	12:58	82	37	16:59
0817	OCPP09	17	82	37	18:23	82	37	21:37
0818	OCPP09	18	82	38	11:02	82	38	12:32
0819	OCPP09	19	82	38	13:02	82	38	17:01
0820	OCPP09	20	82	38	18:26	82	38	21:40
0821	OCPP09	21	82	39	04:47	82	39	07:42
0822	OCPP09	22	82	39	07:59	82	39	11:44
0823	OCPP09	23	82	39	13:05	82	39	17:04
0824	OCPP09	24	82	39	18:28	82	39	21:40
0825	OCPP09	25	82	40	08:01	82	40	11:47
0826	OCPP09	26	82	40	13:08	82	40	17:07
0827	OCPP09	27	82	40	18:29	82	40	21:42
0828	OCPP09	28	82	41	04:50	82	41	07:41
0829	OCPP09	29	82	41	08:05	82	41	11:51
0830	OCPP09	30	82	41	13:11	82	41	17:10
0831	OCPP09	31	82	41	18:34	82	41	21:44
0832	OCPP09	32	82	42	08:07	82	42	11:52
0833	OCPP09	33	82	42	13:14	82	42	17:12
0834	OCPP09	34	82	42	18:33	82	42	21:44
0835	OCPP09	35	82	43	04:41	82	43	07:29
0836	OCPP09	36	82	43	08:10	82	43	11:56
0837	OCPP09	37	82	43	13:16	82	43	17:14
0838	OCPP09	38	82	43	18:35	82	43	21:46
0839	OCPP09	39	82	44	08:11	82	44	11:57
0840	OCPP09	40	82	44	13:19	82	44	17:16
0841	OCPP09	41	82	44	18:36	82	44	21:46
0842	OCPP09	42	82	45	04:41	82	45	07:32
0843	OCPP09	43	82	45	08:14	82	45	12:00
0844	OCPP09	44	82	45	13:21	82	45	17:18
0845	OCPP09	45	82	45	18:38	82	45	21:47
0846	OCPP09	46	82	46	08:15	82	46	12:02
0847	OCPP09	47	82	46	13:22	82	46	17:20
0848	OCPP09	48	82	46	18:39	82	46	21:47
0849	OCPP09	49	82	47	04:43	82	47	07:34
0850	OCPP09	50	82	47	08:18	82	47	12:03
0851	OCPP09	51	82	47	13:25	82	47	17:22
0852	OCPP09	52	82	47	18:40	82	47	21:48
0853	OCPP09	53	82	48	08:19	82	48	12:04
0854	OCPP09	54	82	48	13:27	82	48	17:24
0855	OCPP09	55	82	48	18:41	82	48	21:50
0856	OCPP09	56	82	49	04:46	82	49	07:37
0857	OCPP09	57	82	49	08:21	82	49	12:07
0858	OCPP09	58	82	49	13:28	82	49	17:25

THE PIONEER VENUS ORBITER CLOUD PHOTOPOLARIMETER (OCP) FUNCTIONS BOTH AS A SPIN-SCAN IMAGING SYSTEM WHICH OBTAINS 30-KM RESOLUTION IMAGES OF THE NEAR ULTRAVIOLET CLOUD FEATURES OF VENUS AND AS A POLARIMETER WHICH CAN PROVIDE MAPS AT FOUR DIFFERENT WAVELENGTHS WITH A RESOLUTION OF APPROXIMATELY 500 KM. SCAN LINES OF BOTH THE IMAGES AND POLARIMETRY MAPS ARE GENERATED BY SAMPLING THE INCIDENT RADIANCE AS THE OCP TELESCOPE IS SWEEPED ACROSS THE DISK OF THE PLANET BY THE SPACECRAFT ROTATION (NOMINAL SPACECRAFT SPIN PERIOD IS 12-13 SECONDS). THE MOTION OF THE SPACECRAFT IN ITS NEARLY POLAR ORBIT PROVIDES THE CROSS-SCAN TRANSLATION, PERMITTING A FULL-DISK IMAGE OR POLARIMETRY MAP TO BE BUILT-UP OVER A PERIOD OF ORDER FOUR HOURS.

IN THE IMAGING MODE, EACH SCAN LINE CONSISTS OF 1016 8-BIT DATA NUMBERS REPRESENTING THE PIXELS OF THAT SCAN LINE, PRECEDED BY 64 BITS OF INSTRUMENT HOUSEKEEPING AND STATUS DATA. THE PIXEL DATA NUMBERS INCLUDE A DARK LEVEL OFFSET OF 15 DN, SO THE INTENSITY IS LINEARLY PROPORTIONAL TO THE PIXEL DATA NUMBER MINUS 15. UNDER NORMAL CIRCUMSTANCES, ONE SCAN LINE OF IMAGE DATA IS ACQUIRED EACH SPIN PERIOD OF THE SPACECRAFT. WHEN THE TELEMETRY RATE IS INSUFFICIENT TO READ OUT THE FULL 8192 BITS OF OCP DATA, THE LOST PIXELS AT THE END OF THE SCAN ARE SET TO ZERO BY THE PIONEER PROJECT SOFTWARE THAT GENERATES THE EXPERIMENT DATA RECORDS. MANY IMAGES THUS HAVE SCAN LINES WITH SOMEWHAT FEWER THAN 1016 VALID PIXELS. THE OCP CAN BE COMMANDED TO USE TWO SPIN PERIODS TO READ OUT THE DATA (ALTERNATE ROLL READ OUT MODE COMMANDED ON) TO COMPENSATE FOR LOWER TELEMETRY RATES. THIS REDUCES OR ELIMINATES LOST PIXELS AT THE END OF THE SCAN LINES AT THE EXPENSE OF HALVING THE TOTAL NUMBER OF SCAN LINES IN THE IMAGE AND THUS REDUCING THE CROSS-SCAN RESOLUTION.

THE ORBIT OF THE PIONEER VENUS SPACECRAFT HAS AN INCLINATION OF APPROXIMATELY 105 DEGREES, A PERIOD CLOSE TO 24 HOURS, AND A RELATIVELY HIGH ECCENTRICITY. OCP IMAGING IS PERFORMED DURING THE APPROXIMATELY 18-HR PERIOD CENTERED ON APOAPSIS (POINT IN THE ORBIT FURTHEST FROM THE PLANET) WHEN THE SPACECRAFT IS FAR ENOUGH AWAY FROM THE PLANET AND MOVING SLOWLY ENOUGH FOR THE OPTIMUM APPLICATION OF THE SPIN-SCAN TECHNIQUE WITHIN THE CONSTRAINTS OF THE MISSION, SPACECRAFT TELEMETRY RATE, AND THE OCP INSTRUMENT DESIGN. THE NOMINAL ORIENTATION OF THE POSITIVE SPIN AXIS OF THE SPACECRAFT IS WITHIN A FEW DEGREES OF THE SOUTH ECLIPTIC POLE DIRECTION, SO SCAN LINES CROSS THE DISK OF THE PLANET FROM WEST TO EAST. THE OCP TELESCOPE ARTICULATION IS IN A PLANE CONTAINING THE SPACECRAFT SPIN AXIS, WITH A DISCRETE SET OF COMMANDABLE POSITIONS OR LOOK ANGLES (THE POSITIVE SPIN AXIS DIRECTION IS A LOOK ANGLE OF ZERO DEGREES). DURING THE 18-HOUR IMAGING PERIOD, THE SPACECRAFT IS MOVING NORTHWARD, WITH THE LOOK ANGLE TO THE DISK CENTER CHANGING FROM APPROXIMATELY 130 TO 70 DEGREES. THE PROCEDURE FOR OBTAINING A FULL-DISK IMAGE INVOLVES SELECTING A FIXED LOOK ANGLE APPROPRIATE FOR THE GIVEN PORTION OF THE ORBIT. AS THE SPACECRAFT MOVES NORTHWARD IN ITS ORBIT, THE VIEWING DIRECTION WILL BE TRANSLATED RELATIVE TO THE PLANET UNTIL A SCAN LINE WILL JUST CONTACT THE SOUTHERN LIMB. AFTER A PERIOD OF 3 TO 4.5 HOURS (DEPENDING ON THE LOCATION IN THE ORBIT), THE VIEWING DIRECTION WILL HAVE BEEN SHIFTED BY AN AMOUNT EQUAL TO THE ANGULAR DIAMETER OF THE PLANET, AND THE LAST SCAN LINE ON THE DISK AT THE NORTHERN LIMB WILL BE ACQUIRED.

THIS PROGRAM READS A SET OF RECORDS FROM A SINGLE FILE WHICH CONTAINS THE DATA CORRESPONDING TO A SINGLE IMAGE IN THE OCP IMAGE CATALOG. EACH OF THESE RECORDS IS COMPOSED OF THE 1024-BYTE DATA SEGMENT CORRESPONDING TO ONE SCAN LINE OF THE IMAGE, PRECEDED BY A TIME TAG OF THREE 4-BYTE INTEGERS: YEAR, DAY OF YEAR (DOY), AND TIME OF DAY IN MILLISECONDS. THE PROGRAM GENERATES ONE LINE OF PRINTED OUTPUT FOR EACH SCAN LINE WHICH SUMMARIZES THE INSTRUMENT STATUS AND SOME GENERAL CHARACTERISTICS OF THE IMAGE INTENSITY DATA.

DESCRIPTION OF PRINTOUT

